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DRA

MARKET STUDY PHASE II FOLLOW-UP ACTIVITY

The Baylor Mark III Haploscope

(NASA-CR-156141) MARKET STUDY PHASE 2  
FOLLOW-UP ACTIVITY. THE BAYLOR MARK 3  
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**IITRI**

MARKET STUDY PHASE II FOLLOW-UP ACTIVITY

The Baylor Mark III Haploscope

Prepared for:

Technology Utilization Office  
National Aeronautics and Space Administration  
Washington, D.C.

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December, 1977

## TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION.....	1
2. BACKGROUND.....	1
3. APPROACH.....	3
4. RESULTS.....	7
5. CONCLUSIONS AND RECOMMENDATIONS.....	13

### APPENDIX

A. Letter of Transmittal to Interested Manufacturers	16
B. Letters from Manufacturers Defining their Final Position	19

## 1. INTRODUCTION

This report documents our summary findings regarding a follow-up to the Phase II market assessment of the Baylor Mark III Haploscope. The Phase II activity is documented in IITRI's report "Computerized Binocular Vision Testing": A Market Study of the Baylor Mark III Haploscope', dated March 15, 1977. The objectives of our recent follow-up efforts have been to:

- Accelerate Commercialization of the Haploscope
- Develop an Approach to Quickly and Reliably Determine Level of Manufacturer Interest in NASA items such as the Haploscope
- Define the General Nature of the Decision Making Process within Firms as it Concerns Project Selection and Potential new Product Evaluation
- Assess the Implications for the NASA Marketing Program

We accomplished these objectives thru consideration of our Phase II findings of the haploscope. The NASA contractor report, NASA CR-2584, 'The Mark III Haploscope' was used in conjunction with the Phase II study as a means of presenting to appropriate manufacturers the capabilities and potential which the device may have to compliment their product line. The contractor report describes the technical attributes of the haploscope, both as it has been developed to date, and as it has the potential for being developed in the future. Our overall goal is to utilize these two tools to impact on appropriate manufacturers in the market place as quickly and effectively as possible.

## 2. BACKGROUND

The computerized binocular vision tester (i.e. haploscope) was developed initially for the space program under a contract of NASA Ames to Baylor College of Medicine. It was recognized that the concept could be applied to vision testing situations on earth as well. The device offers the primary advantages of speed coupled with accuracy, flexibility for testing a variety of vision parameters, and compatibility with a computerized vision diagnosis and documentation

center concept. There are other computerized vision testers on the market at the present time, but they do not preclude the possibility of a market need for the haploscope. The haploscope concept has been published in the literature (e.g., Optical Engineering, Vol. 15 no. 4, July - August 1976), and no patents exist to date.

The findings of our Phase II study were mixed as determined by the immediate vs. long-term realities of the market place. The long-term outlook for computerized vision care is positive and indicates considerable market opportunity. This is based on our determination that the following trends will create a demand for greater vision care efficiency and effectiveness:

- Some form of national health insurance
- Growth of Health Maintenance Organizations
- Increased emphasis on vision care as it relates to education and job performance
- A general increase in population (particularly over 65) which stresses the present vision care facilities
- A more computer-oriented group of potential users (ophthalmologists, optometrists and technicians) are only beginning to have an impact on purchase decisions

All of these factors define the need for more efficient, accurate and reliable instrumentation, as well as coordination of the instrumentation. The computer is certain to play a large role in satisfying these needs.

The Phase II study findings also defined barriers which restrict the immediate market acceptance of a device such as the haploscope. There is a product acceptance lag after market introduction which has been demonstrated by other computerized devices already on the market. Cost is the main constraint. Justification for purchase can generally be made on the basis of high patient load situations. Just as important as cost, though less tangible, is the education time frame and personal perspective of the end-user and frequent specifier, the practitioner. The real purchase potential of computerized instrumentation, aside from high volume clinics, lies with those practitioners who will be graduating in the future. These users will be familiar with computerized instruments and will need to purchase

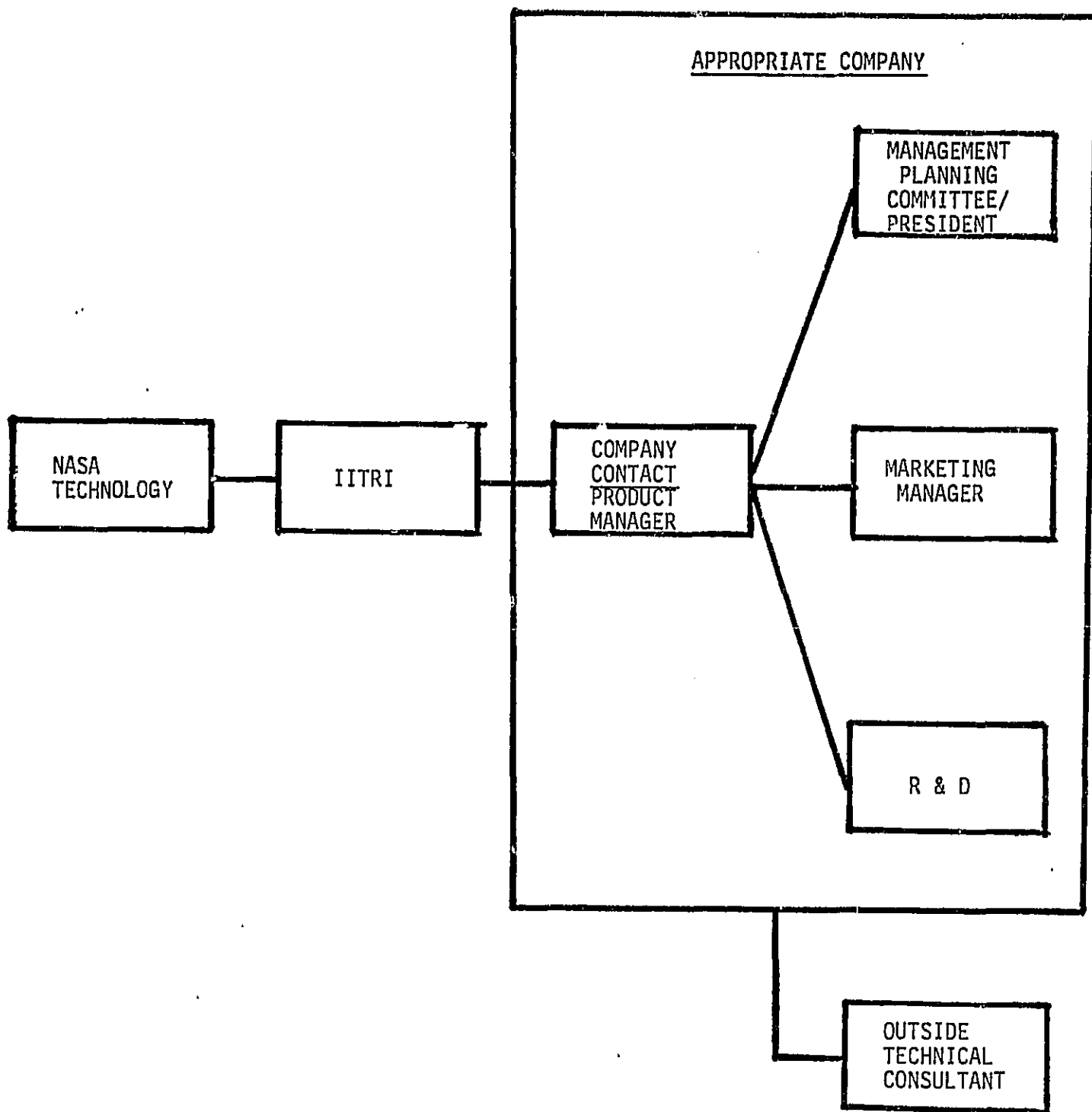
equipment as they begin private practice or as they become influential in the purchase decision in clinics, group practice, or hospital service.

The overall market potential as a result of these factors is characterized as low in the near future (5-10 years) but high in the long term as the vision care industry matures technologically and is forced to respond with greater effectiveness to the needs of the population. It is this outlook and time frame which plays a key role in a manufacturer's assessment of the haploscope's commercialization potential. These issues will be addressed in the course of this follow-up report in order to accomplish the objectives set forth in the introduction to the mutual benefit of NASA, interested firms and potential end-users.

### 3. APPROACH

We accomplished our objectives by first considering the nature of the commercialization decision-making process in the vision instrumentation industry, and then structuring a set of tasks in order to interject into this decision-making process at the proper organization level. The chart on the following page illustrates the various roles and interactions which are critical in assessing the potential of a new product as a candidate for commercialization. It is clear that in a complex, product-oriented firm it is the product manager who by-and-large has the overall perspective, and often the responsibility for coordinating engineering, marketing and sales information. Depending on the particular organization structure, this role may also be assumed by the marketing manager.

The quickest means of determining the commercial interest in a NASA item such as the haploscope is to identify the product manager and provide him with sufficient information (preferably in the form of written reports) with which to make or obtain a judgement. Usually several stages of discussion are necessary for him to provide a response representing the organization. This may include review by R&D, marketing, engineering, a management product planning committee or the president.



NEW-PRODUCT EVALUATION PROCESS



Some firms utilize outside, individual consultants or authorities at universities or with medical affiliations who may have an added perspective on the needs of the marketplace.

This process consumes several weeks or months depending on the sophistication of the decision-making process, the particular time of year (e.g., before or after next fiscal year budget levels have been fixed and priorities established), the particular interest of the firm in technology developed elsewhere or the degree of synergism with the existing product line. These are elements of a new product evaluation process which is typical of high technology, commercial product-oriented firms. A more comprehensive listing of such elements is provided on the following page.

Our knowledge about this new product evaluation process was utilized to develop a set of tasks which makes use of our industry contacts and previous market findings from the Phase II study. We focused on those potential manufacturers who are presently engaged in or known to be interested in entering the computerized vision instrument field. On this basis we structured the following tasks:

- Compile a list of manufacturers of competitive products related to the generic nature of the haploscope and similar products used in vision care.
- Contact product managers within each target firm who have responsibility and control of engineering, marketing and sale of a vision testing product and discuss the following:
  - Define NASA's objective to disseminate technology to industry, and IITRI's marketing role in this process
  - Describe the product (i.e., the haploscope) in terms which compare it to presently marketed products
  - Establish whether any interest exists on the part of the manufacturer for commercializing the product development
  - Refer the product manager to the innovator and to NASA Headquarters for further in-depth technical or commercialization information.

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## NEW-PRODUCT EVALUATION CHECKLIST

- RESEARCH AND DEVELOPMENT
  - EXTENT OF RESEARCH KNOW-HOW
  - PATENT STATUS
  - CHANCE OF TECHNICAL SOLUTION
  - MANPOWER AVAILABILITY
  - EXTENT OF TECHNICAL SERVICE REQUIRED
- MARKET RESEARCH
  - ESTIMATED SIZE OF MARKET
  - MARKET TREND
  - PRICE AND DEMAND STABILITY
  - PRODUCT COMPETITION
- MARKET DEVELOPMENT
  - CHANCE OF COMMERCIAL SUCCESS
  - MARKET DEVELOPMENT REQUIREMENTS
  - TIME REQUIRED TO COMMERCIALIZE
  - VALUE ADDED TO CUSTOMER'S PRODUCT
  - SIMILARITY TO PRESENT PRODUCT LINES
- SALES
  - EFFECT ON PRESENT PRODUCTS
  - REQUIREMENT FOR TECHNICAL SERVICE
  - SUITABILITY OF PRESENT SALES FORCE
  - SALES COSTS
  - NEW CUSTOMERS--TYPE AND QUALITY
  - ESTIMATED ANNUAL SALES
  - CAPTIVE USE
- MANUFACTURING
  - REQUIRED CORPORATE SIZE
  - FACILITY AVAILABILITY
  - PROCESS FAMILIARITY
  - AVAILABILITY OF RAW MATERIALS
- FINANCE AND CONTROL
  - ANTICIPATED RETURN ON INVESTMENT (BEFORE TAXES)
  - NEW FIXED CAPITAL PAYOUT TIME
  - RATIO OF PRODUCTION COST TO SELLING PRICE
  - RESEARCH AND DEVELOPMENT COST PAYOUT TIME
  - RATIO OF RESEARCH COST TO MARKET POTENTIAL
- CORPORATE
  - CONTRIBUTION TO COMPANY GOALS
  - CONTRIBUTION TO CORPORATE IMAGE
  - POSSIBLE GOVERNMENT REACTION

- Send the contractor report and the Phase II market study to those manufacturers who are interested. See Appendix A for a letter of transmittal to a potential manufacturer.
- Follow up as frequently as individual circumstances warrant in order to determine the status, opinions about and disposition of the information and consideration of the haploscope
- Continue to encourage the manufacturer to contact NASA and the innovator to facilitate the exchange of information
- Assess the results of our activity by defining the real opportunities for commercialization, and the rationale of the manufacturers who decide not to pursue commercialization
- Prepare and submit a summary report to NASA with findings and recommendations regarding the haploscope and commercialization enhancement approaches used in the course of this follow-up activity or recommended for future consideration.

This process described by the above statements, consists of company targeting, key individual identification, information exchange and repetitive contact over an extended period of time. It is useful in presenting a NASA item for commercialization and defining its potential as quickly as possible. The following section defines the results of our efforts utilizing the process defined above.

#### 4. RESULTS

The results of our activity are defined according to the initial objectives set forth in the introduction. The development of a general approach for quickly determining manufacturer interest, and the acceleration of the commercialization of the haploscope provide the perspective for reviewing the following findings.

The decision-making process was characterized in the previous section as being strongly a function of the role of individuals and their interaction, as well as the entire corporate philosophy, orientation and goals. Tables 1 and 2 on the following pages profile the potential manufacturers and their interest during the study.

TABLE 1

## PROFILES OF POTENTIAL MANUFACTURERS

COMPANY	SALES VOLUME *	PRINCIPLE PRODUCTS*	COMPANY CONTACT
● Acuity Systems, Inc. 11413 Isaac Newton Sq. Reston, Va. 22090	N/A	Automated Refraction Equipment for Health Care Field.	Mr. Steve Heller V.P. Marketing 703/471-4700
● American Optical Scientific Instruments Div. Southbridge, Mass. 01550	\$200-300M	Ophthalmic Supplies Including Optical, Medical Electronic & Scientific Instruments	Mr. Buhler 617/765-9711
● Bausch & Lomb Scientific Optical Products Div. 1400 N. Goodman St. Rochester, N.Y. 14602	\$297M	Ophthalmic and Consumer Products Including Ophthalmic and Optical Instruments, Microscopes Optical Measuring Instruments etc.	Mr. David F. Henderson Jr. Product Manager Ophthalmic Instruments 716/338-6287
● Coherent Radiation 3210 Porter Drive Palo Alto, Ca. 94304	\$14.5M	Lasers, Automated Ophthalmological Products	Mr. Bill Krepick Product Manager, Dioptron 415/493-2111
● Gulf & Western Applied Science Laboratory 335 Bearhill Rd. Waltham, Mass. 02154	\$2.5B+	Financial Serv. & Insurance, Manufacturing, Leisure- Time Products, National Resources, Consumer Goods, Scientific Instruments	Mr. George S. Leonard Products Manager 617/890-5100
● Honeywell Radiation Center 2 Forbes Rd. Lexington, Mass. 02173	\$2.6B+	Aerospace & Commercial Control Systems, Electro-optical Products Test Instruments, Information Systems, etc.	Mr. Merchant 617/862-6222
● Humphrey Instruments 3080 Teagarden San Leandro, Ca. 94577	N/A	Vision-testing Instrumentation	Mr. Charles Campbell Product Manager 415/895-9110

\* In all cases sales volume and products represent those of the corporation,  
not the subsidiary or division.

TABLE 1

## PROFILES OF POTENTIAL MANUFACTURERS (CONT.)

COMPANY	SALES VOLUME *	PRINCIPLE PRODUCTS *	COMPANY CONTACT
• Keystone View Div of Mast. Dev. Co. 2212 E. 12th Street Davenport, Ia 52803	N/A	Manual Vision Screening Equipment Including Screeners, Charts, etc.	Mr. Don Fish Product Manager 319/326-0141
• NARCO Bio-Systems, Inc. Subs. Narco Scientific Inc. 7651 Airport Blvd. Houston, Tex. 77017	\$79.1M+	Communication, Medical, Dental Equipment and Instruments for Teaching, Research, and Clinical Monitoring	Mr. Warner Marketing Manager 713/644-7521
• TITMUS OPTICAL A ZEISS Co. P.O. Box 191 Petersburg, Va. 23803	N/A	Manual Vision Screening Equipment, Optical Equipment and Instruments	Mr. W. Bruce Cayey Manager Product Marketing 804/732-6121
• TRACOR, Inc. Medical Instruments Div. 6500 Tracor Lane Austin, Tex. 78721	\$95.5M+	Electronic Products, Medical Instruments and Analytical Equipment	Mr. Jim Sebesta Engineering Manager 512/926-2800

\* In all cases sales volume and products represent those of the corporation,  
not the subsidiary or division.

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TABLE 2

## LOG OF CONTACTS WITH POTENTIAL MANUFACTURERS

Company	Initial Phone Interview #	Reports Sent By	Follow-Up #1	Follow-Up #2	Follow-Up #3 **
Acuity Systems	Not interested	-	-	-	-
American Optical	Not interested	-	-	-	-
Bausch & Lomb	5/27/77 Moderate interest	6/16/77	6/23: Need more time to evaluate; may not have funds to develop	7/21: Reports sent to R&D for evaluation	7/27: Letter indicates no interest due to limited market, high cost.
Coherent Radiation	5/27/77 High interest	6/16/77	6/28: Need more time to evaluate due to new management in division	7/25: New management has delayed consideration indefinitely	-
Gulf & Western	5/24/77 High interest	5/25/77	6/28: Mr. Leonard in Europe until 7/5/77	8/26: Reports sent to outside consultant for review	9/1: Not interested due to commitments to other new product areas
Honeywell	6/2/77 Moderate interest	6/16/77	6/28: Forwarded to Dr. Kanarick, Assistance & Research Center (612/378-4141)	7/21: Dr. Kanarick forwarded report to Dr. Leon Williams (612/378-5034)	7/25: Does not interface with objectives of Honeywell
Humphrey Instruments	5/27/77 High interest	6/16/77	6/28: Not interested further	-	-
Keystone View	5/27/77 High interest	6/16/77	6/23: Mr. Fish feels that market penetration estimates are high, needs more time to evaluate	7/21: Reviewed by V.P. Mktg., presently on President's desk, seems to require high investment	9/1: No action is anticipated at this time
Narco	Not interested	-	-	-	-
Titmus Optical	5/27/77 High interest (presently are developing their own)	6/16/77	6/28: Need more time to evaluate (two weeks)	7/21: Reports sent to management committee, need another month	9/7: No interest at present time (received letter)
Tracor	6/13/77 Moderate interest (Had done similar development)	6/14/77	6/28: Keenly interested in elements of haploscope system, not as is.	7/21: Reports in mktg. for review; will visit innovator in Houston	8/29: May consider for development no interest at pre-sent time

\* Note: All interviews are conducted with the individuals defined in Table 1.

\*\* Letters received from manufacturers are included as Appendix B.

The key decision-makers are defined and their opinions are recorded at several key steps of the decision-making process of the firms. It is important to note the impact of forwarding the reports (both technical and market) on the opinions and interest level of the managers interviewed. Submission of documentation of this type is necessary to quickly and reliably identify the seriously interested firms and carry on a productive commercialization dialogue.

The specific findings regarding commercial interest in the haploscope are presented as Table 3 following. The overall result is that no firm is seriously interested in commercializing the haploscope at the present time. There is no one overriding rationale for their decision, but rather a variety of responses which are a function of both individual firm characteristics and the attributes of the haploscope in relation to the present market status of computerized vision instrumentation. These factors are defined more explicitly in the following section.

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TABLE 3SUMMARY OF MANUFACTURER INTEREST IN HAPLOSCOPE

<u>POTENTIAL MANUFACTURER</u>	<u>INTEREST</u>	<u>RATIONALE</u>
ACUITY SYSTEMS	NO	● RELY ON INTERNAL R&D (NOT INVENTED HERE)
AMERICAN OPTICAL	NO	● WILL NOT FIT IN EXISTING PRODUCT LINE ● NOT INVENTED HERE
BAUSCH & LOMB	NO	● TOO EXPENSIVE TO GENERATE SIZEABLE DEMAND ● TOO RESEARCH-ORIENTED IN TERMS OF APPLICATION
COHERENT RADIATION	NO	● NO INTEREST AT PRESENT TIME DUE TO MANAGER CHANGES OCCURRING
GULF & WESTERN	NO	● CANNOT JUSTIFY PRODUCT LINE EXPANSION AT THIS TIME DUE TO OTHER COMMITMENTS ● EXPRESSED INTEREST IN SEEING HAPLOSCOPE
HONEYWELL	NO	● NO INTEREST IN ENTERING THIS PARTICULAR COMMERCIAL MARKET
HUMPHREY INSTRUMENTS	NO	● TOO EXPENSIVE ● MUCH ADDITIONAL DEVELOPMENT REQUIRED ● NOT DIFFERENTIABLE FROM PRESENT PRODUCT
KEYSTONE VIEW	NO	● LOW MATCH WITH PRESENT CAPABILITIES (i.e., NO ELECTRONICS/COMPUTER EXPERTISE)
NARCO	NO	● DROPPING PRESENT LINE OF EYE-TRACKING INSTRUMENTS
TITMUS OPTICAL	NO	● NOT IN LINE WITH COMPANY OBJECTIVES ● DOES NOT ADDRESS CURRENT MARKET DEMAND
TRACOR	NO	● NO DESIRE TO COMMIT TO DEVELOPMENT EFFORT AT PRESENT TIME ● MAY REVIEW AS POSSIBLE DEVELOPMENT PROJECT FOR 1979

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## 5. CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

There are several key conclusions which are drawn concerning the nature of our follow-up activity. Our conclusions are that the follow-up activity can:

- INITIATE INDUSTRIAL INVOLVEMENT EARLY-ON IN ORDER TO:
  - Contribute Resources
  - Provide Product Definition
  - Provide Market Perspective
- PROVIDE ADDED DIMENSION TO MARKET STUDIES BY OBTAINING TECHNICAL/MARKETING APPRAISAL FROM INDUSTRY:
  - At High Strategic Levels of Corporate Decision Making
  - For Direct Comparison of NASA Technology to 'In-House' Research Projects @ Project Selection Level
  - To Stimulate Interest, Involvement, Action, Commitment
- REDUCE UNCERTAINTY/RISK ASSOCIATED WITH NASA's PROJECT SELECTION BY:
  - Providing Greater Opportunity for Firms to Study Information
  - Giving Firms More Time to Consider Product Potential
  - Involving More Decision Makers (With a Diversity of Responsibilities and Background)
  - Permitting More Serious Assessment than Possible over Phone
- AMPLIFY THE VISIBILITY OF NASA AS A POTENTIAL SOURCE OF PRACTICAL, PROBLEM-SOLVING TECHNOLOGY

At the same time conclusions about the commercialization of the haploscope can also be made in the context of the rationale presented by the firms which were contacted. These are summarized below:

- The market place for vision instrumentation is not perceived as sophisticated enough as yet to generate substantial demand.
- The haploscope does not provide a clear product differentiation from existing computerized vision instruments or superiority to these instruments.

- There exists a 'not-invented-here' syndrome among the major ophthalmic goods manufacturers, and a reluctance to invest in a product without clear rights and privileges of manufacture and without some degree of technical synergism with existing products being offered.
- The payback period is regarded as too long, with the true potential too far in the future to justify investment at the present time in substantial technical and market development.
- The haploscope as it has been developed to-date requires a total redesign in order to up-date the technology and address more directly the needs of the practitioner.

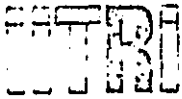
### Recommendations

Specific recommendations can be made regarding the follow-up process as a tool in the transfer of aerospace technology to industry. The main aim of accelerating the commercialization process in selected instances is accomplished thru the following recommended methodology:

- CONDUCT 'PHASE III' FOLLOW-UP FOR SELECTED STUDIES WHERE
  - NASA Agrees Follow-Up is Appropriate
  - Technology is Developed to Prototype Stage and Performance Data is Available
  - Item is Preferably 'TU' Derived
- SUBMIT PROPOSAL FOR PHASE III STUDY WHICH WILL
  - Define Scope
  - Specify Tasks
  - Estimate Time and Cost
- CONDUCT PHASE III STUDY WITH AN APPROACH BASED ON
  - Phone Interviews
  - Personal Interviews as Required
  - A Duration Dependent on Potential Manufacturer's Decision-Making (3-6 Months Typical)
  - Submittal of Monthly Status Reports
- SUBMIT FINAL LETTER REPORT INDICATING
  - Seriously Interested Manufacturers and Their Preliminary Recommendations for Commercialization
  - Rationale for Lack of Interest

APPENDIX A

LETTER OF TRANSMITTAL



IIT Research Institute  
10 West 35 Street, Chicago, Illinois 60616  
312/567-4000

May 31, 1977

Mr. Dave Henderson  
Ophthalmic Instruments Product Manager  
Bausch & Lomb  
1400 N. Goodman  
Rochester, New York 14602

Dear Mr. Henderson:

I appreciated the opportunity to discuss the NASA Technology Utilization Program with you regarding a computerized binocular vision tester. This instrument was developed at the Ophthalmic Systems Research Laboratory of Baylor College of Medicine, Houston and funded by National Aeronautics and Space Administration thru their Ames Research Center, Moffett Field, California. We have a NASA contract at IIT Research Institute to evaluate the commercial potential of the device (as well as other products developed for various NASA missions) in relation to the marketplace. The results of our preliminary market study are then utilized as a project selection and prioritization tool by NASA's Office of Technology Utilization in Washington, D.C.

Our work also involves the determination of which manufacturers of related products may represent significant prospects for commercializing the NASA developments. As a result of your interest in the vision tester, I am enclosing with this letter a copy of our market study entitled "Computerized Binocular Vision Testing." A NASA Contractor Report CR-2584, "The Baylor Mark III Haploscope," which presents the technical aspects of the instrument, will be forwarded to you as soon as possible. Please review the reports at your earliest convenience and feel free to contact me if you have any questions.

As you become familiar with the instrument and its capabilities, you can address any questions regarding the development work to Dr. Thomas Decker and any questions regarding the means for obtaining the technology to Mr. Ray Whitten as follows:


Mr. Dave Henderson  
May 31, 1977  
Page -2-

Dr. Thomas A. Decker  
Director, Ophthalmic Systems  
Research Laboratory  
Baylor College of Medicine  
Texas Medical Center  
Houston, Texas 77030  
713/797-0291

Mr. Ray P. Whitten  
Biomedical Applications  
Program Manager  
Technology Utilization Office  
NASA Headquarters  
Code KT  
Washington, D.C. 20546  
202/755-3140

I look forward to discussing the potential of the computerized vision tester further with you in the near future.

Sincerely,



Thomas M. Jacobius  
Associate  
Techno/Economic Studies Group

TMJ/dlb

enclosure

APPENDIX B

LETTERS FROM MANUFACTURERS

July 27, 1977

Mr. Thomas M. Jacobius  
IIT Research Institute  
10 West 35 Street  
Chicago, IL 60616

Dear Mr. Jacobius:

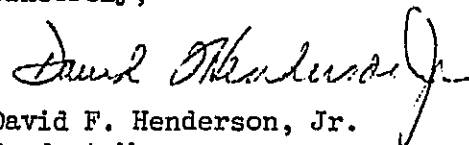
Thank you for the information you sent me on the Mark III Haploscope. As I mentioned to you, we are not in a position at the present time to pursue a project of this nature.

I've showed the two reports to some of our people and their general comment was that an instrument such as this would be basically a research tool. Because of its cost, I don't know if it could be developed into a commercial item. You might be interested in knowing that a few years ago B&L did some work on a Haploscope. A single instrument was developed and after much effort we found practically no interest in it.

Regarding the market size and potential sales, my general reaction is that with selling price of \$15-20K, there would be a much smaller number among O.D.'s and M.D.'s who would purchase such equipment. They would have to have extremely high volume practices in order to justify such instrumentation.

I hope this information is helpful to you.

Sincerely,



David F. Henderson, Jr.  
Product Manager  
Ophthalmic Instruments

DFH:sam

8 September 1977



Mr. Thomas M. Jacobius  
ITT Research Institute  
10 West 35 Street  
Chicago, Illinois 60616

Dear Tom:

We have thoroughly reviewed the information you provided on the Computerized Binocular Vision Tester developed by NASA. Based upon our understand of the vision screening markets and our objectives, we do not feel this technology is of value to us at this time. We would however like to keep the door open for future consideration. Therefore, we have taken the liberty of retaining the information you submitted. If we should want to re-open our discussion, we will contact you.

Thank you for your consideration, and if we can ever be of service please call.

Sincerely yours,

A handwritten signature in cursive script that reads "W. Bruce Cavey".

W. Bruce Cavey  
Manager  
Product Marketing

dkeTH8